KIMO®
INSTRUMENTS

KIGAZ 200

Flue gas anlyser

LIGAZ software

User manual

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ANALYSER

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1.1. Analyser description

KIGAZ 200 instrument is a gas analyser with two **interchangeable sensors (O_2 and CO-H_2)**, with additional option of adding 1 sensor (**NO** or **CH_4**) or is a gas analyser with **three interchangeable sensors (O_2, CO-H_2 and NO)** with additional possibility of a 4th sensor **(CH_4)**.
Its main features are the following :

- Autozero in the duct
- Protection of CO sensor by solenoid valve
- Led on handle for lightning of dark areas
- External water trap
- Grey level 3.5" screen
- 2 thermocouple connections
- 2 Go of memory

The gas analyser is supplied in a transport case in ABS or metallic (optional) with a magnetic protective cover, a differential pressure kit, an interchangeable flue gas probe of 300 mm length with integrated draft and LED, a Li-ion battery and its charger, Ligaz software, a USB cable and a calibration certificate. A paper roll for the printer and a filter are also provided.

This gas analyser is designed to control parameters of flue gas in exhaust duct of heating units. It can not be used in a permanently way and/or used as an alarm system.

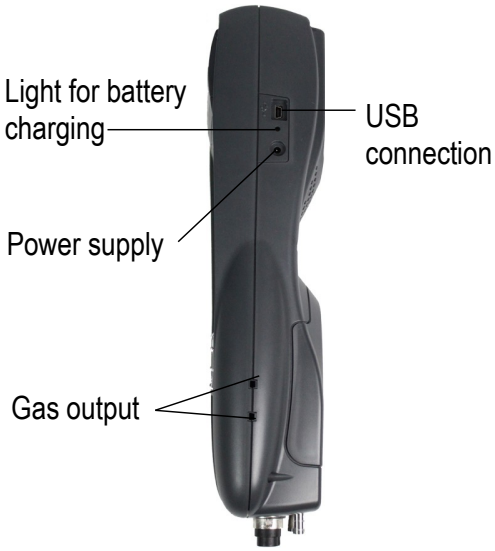
1.1.1. Overview of the analyser

1.1.2. Presentation of the keypad and screen

1.1.3. Connection of the analyser

Top view

Bottom view



Side view

1.2. Main features

- **Screen**

Backlighted 3.5" grey scale screen. It allows to display measured parameters in a more comfortable format for the operator. Thanks to the zoom function (OK key), you can view on the screen the measured value in increased characters.

- **Printer**

The paper of the instrument is a thermal paper with a 10-year guarantee. It has an easy replacement system of the paper (Easyload). In addition, printing is fast.

- **Battery charger**

The instrument is supplied 12V, 3.75A power adapter to load the internal batteries. The current loading is indicated by a battery symbol on the top left of the screen. The red LED on the right side of the gas analyser stays on until the battery loading is completed.

- **Flue gas suction pump**

The pump, inside the gas analyser, is a diaphragm pump with a motor energized in direct current directly by the instrument in a way to get an optimal suction of flue gases.

- **Flue gas probe**

Probe in stainless steel with an overmoulded handle in plastic, with a standard length of 30 cm (others lengths are available as option, please see the technical datasheet for kigaz) with a fixing cone to maintain the contact tip in the duct. Interchangeable, it has a LED allowing to light the dark areas. The probe is connected to the instrument by a neoprene tube of2.50 meters.

- **Interchangeable measurement sensors**

The analyser uses electrochemical sensors to measure the oxygen and the carbon monoxide (compensated in H_2 hydrogen). Sensors are interchangeable.

- **Temperature sensors**

Flue gas temperature is measured with a thermocouple integrated in the contact tip. The connection to the analyseris made thanks to a single male connector compensated in temperature. K thermocouple (nickel-nickel chromium) allows continuous measurements up to **1250°C**.
The instrument has a NTC thermoresistance for the measurement of internal temperature ; this sensor is also used for the measurement of ambient temperature.
If a temperature control of the combustive air must be performed directly by th supply duct (room sealed boiler), a Pt100 temperature probe (ref : SAP150P) will be used. It is recommended to perform this measurement to make the efficiency calculation of the installation more accurately.

- **Pressure sensor**

The analyser has one internal piezoelectric sensor for the measurement of the differential pressure (Delta P) with manual autozero.

- **Supply input of flue gases and +/- pressure**

The analyser has a single connector allowing the connection of a flue gas probe.

- **Types de combustibles**

The analyser is supplied with a memorization of technical data which characterize the 15 most known combustibles. It is also possible to add 5 combustibles and their corresponding features.

- **Calibration certificate**

The analyser is calibrated by comparison with standard of metrology laboratories, which are periodically certified closed to laboratories known at the international level. Each analyser is supplied with its calibration certificate in which, for every parameters, are indicated the nominal value, the one measured, the admitted error limits and the found error.

- **EMC compatibility**

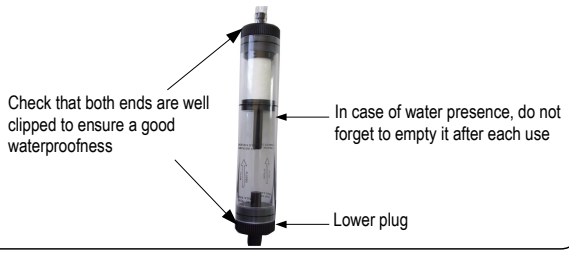
The analyser complies with n°2004/108/EC directive on electromagnetic compatibility. Document available on request.

- **Water trap**

The water trap is placed on the tube that links the flue gas probe to the Kigaz 150. The measured gases go through the filtering element allowing the recovery of condensates (liquid one or solid one).
The filtering element is placed 15 cm from the analyser and is divided into 2 parts :

– one recovers the liquid particles.
– the other contains a filter that stops the smallest particles in suspension and avoid them to reach the electro-chemical sensors

For a better measurement, the water trap must be in vertical position.
Empty and clean the mater trap after use.


Check that both ends are well clipped to ensure a good waterproofness
In case of water presence, do not forget to empty it after each use
Lower plug

- **Customers management**

The analyser allows to record customers, theirs respective boilers and inspections. Once the features of customers and boilers are completed in the analyser, the operator can easily assign the different measured values to a customer and his boiler. These data can then printed and/or transferred to a computer thanks to Ligaz software.

- **Autozero**

The analyser has the “autozero in the duct” function, it means that the operator can perform measurements (draft, temperature...) while the analyser inhales fresh air in the room. This function allows to save time on the inspection places.

- **Protection by solenoid valve**

The analyser is equipped with the CO protection function that allows to avoid high concentrations of CO that could damage the analyser and the sensors. The CO measurement is stopped when it exceeds 2000 ppm (default configuration of the threshold and adjustable by the operator). All the measurements stay possible unless the CO measurement.

- **Opacity index measurement (optional)**

It is possible to fill in the analyser with opacity index values measured according to the Bacharach scale. The analyser will calculate the average and results will be printed on the ticket. This measurement must be performed with an opacity pump which is available as an accessory (ref : PMO).

- **Gas flow**

It is possible to measure the gas flow of an installation, to compare it with a theoretical gas flow and as a result to estimate the installation consumption.

- **Gas network leak testing (optional)**

It is possible to check the tightness of an installation. For this control, use the pressure sensor used for the draft measurement of the shaft.

- **Measured values**
  – **O_2 :** percentage of oxygen in flue gases
  – **CO :** concentration of CO in flue gases
  – **NO :** concentration of NO in flue gases
  – **Tf :** flue gases temperature
  – **Ta :** combustive air temperature

- **Calculated values :**
  - **λ : Air Excess :** connection between the volume of combustive air and the requested volume necessary for a combustion in stoichiometric conditions.
  - **CO_2 :** percentage of carbon dioxide in flue gases
  - **ΔT :** difference between the flue gases temperature and the combustive air temperature
  - **NOx :** concentration of NOx in flue gases
  - **Qs :** percentage of waste heat throughout the shaft
  - **ηs : Lower efficiency (or sensible) :** this the burner efficiency calculated according to the EN50379 standard disposals. This is a ratio between the conventional heating power end the burner heating power. Among the combustion losses, only the sensible heat lost with the flue gases is taken into account, neglecting the radiation losses and incomplete combustion losses. This value is referred to LHV (Lower Heating Value) and can not be higher than 100%.
    The sensible efficiency value is to be compared with the minimum efficiency stated for the heating systems performances.
  - **ηt : Higher efficiency (or total) :** is the sum of sensible efficiency and the additional efficiency deriving from the recovery of water vapour condensation contained in the flue gases. When it s greater than sensible efficiency, then condensation is taking place. It is referred to LHV (Lower Heating Value) and can exceed 100%. The LHV is calculated by an algorithm developed by Kimo and its value must be considered as indicative.
  - **CO (O_2) :** Concentration of CO in flue gases in mg/m^3. It is calculated according to O_2 reference value indicated in the analyser (see page 19).
  - **NO (O_2) :** Concentration of NO in flue gases in mg/m^3. It is calculated according to O_2 reference value indicated in the analyser (see page 19).
  - **NOx (O_2) :** Concentration of NOx in flue gases in mg/m^3. It is calculated according to O_2 reference value indicated in the analyser (see page 19).

1.3. Technical features

Parameter	Sensor	Measuring scale	Resolution	Accuracy*	T_{90} response time
O_2	Electrochemical	From 0% to 21%	0.1% vol.	±0,2% vol.	30 s
CO (with H_2 compensation)	Electrochemical	From 0 to 8000 ppm	1 ppm	From 0 to 200 ppm : ±10 ppm From 201 to 2000 ppm : ±5% of measured value From 2001 to 8000 ppm : ±10% of measured value	30 s
NO	Electrochemical	From 0 to 5000 ppm	1 ppm	From 0 to 100 ppm : ±5 ppm. From 101 to 5000 ppm : ±5% of measured value	30 s
NOx	Calculated**	From 0 to 5155 ppm	1 ppm		
CO_2	Calculated**	From 0 to 99% vol	0.1% vol		
CH_4	Semiconductor	From 0 to 10000 ppm From 0 to 1% Vol From 0 to 20 %LEL	1 ppm 0.0001% Vol 0.002%LEL	±20% of full scale	40 s
Flue gas temperature	Thermocouple K	From -100 to +1250°C	0.1°C	±1 °C	45 s
Ambient temperature	Internal NTC	From -20 to +120°C	0.1°C	±0.5°C	
Ambient temperature	Pt100 (1/3 Din external probe)	From -50 to +250°C	0.1°C	±0.3% of the measured value ±0.25°C	30 s
Dewpoint temperature	Calculated**	From 0 to +99°Ctd	0.1°C		
DHW temperature	TcK (external probe)	From -200 to +1300 °C	0.1°C	±1 °C	
Differential pressure Draft	Piezoelectric	From -20 000 to +20 000 Pa	1 Pa	From -20 000 to -751 Pa : ±(-0.5% of measured value +4.5 Pa) From 750 to -61 Pa : ±(-0.9% of measured value +1.5 Pa) From -60 to 60 Pa : ±2 Pa From 61 to 750 Pa : ±(0.9% of measured value +1.5 Pa) From 751 to 20 000 Pa : ±(0.5% of measured value + 4.5 Pa)	
Loses	Calculated**	From 0 to 100%	0.1%		
Flue gas velocity		From 0 to 99.9 m/s	0.1 m/s		
Excess air (λ)	Calculated**	From 1 to 9.99	0.01		
Lower efficiency (ηs)	Calculated**	From 0 to 100%	0.1 %		
Higher efficiency (ηt) (condensation)	Calculated**	From 0 to 120%	0.1%		
Opacity index	External instrument	From 0 to 9			

**All accuracies indicated in this document were stated in laboratory conditions and can be guaranteed for measurements carried out in the same conditions, or carried out with required compensation.*
***Calculation is made based on the measured values by the analyser.*

2. Safety instructions

The following safety instructions have to be strictly observed.
Not respecting these safety instructions can lead to a loss of warranty.

- **The analyser should not to be used in and under water.**
- **The analyser should not to be placed near or directly at open fire or heat.**
- **The indicated range of temperature of the probe is not to be exceeded, as the probe and temperature sensor could be destroyed.**
- **After measurements, before packing the analyser, wait for the probe to be cold. As long as it is hot, the probe could produce injuries.**
- **The exhalations of alcohol liquids (lubricants, petrol, spirit, vanish...) may damage the sensors of the analyser. Therefore, it is forbidden to preserve or use these fluids nearby the analyser.**
- **Load the battery only with Kimo charger. Use another type of charger can damage the battery and the analyser and can cause electrical shocks.**

3. Perform a combustion analysis

3.1. Prepare the instrument before the analysis

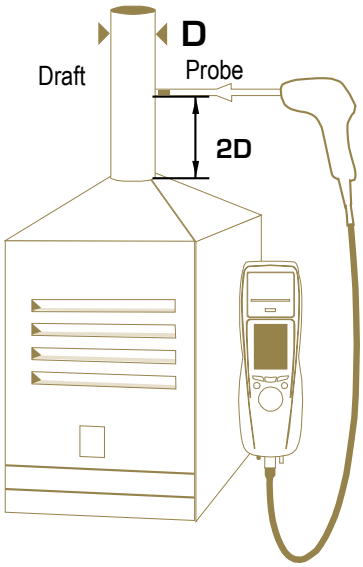
During the measurement, the analyser must be in vertical position or in horizontal position. Do not hold the analyser in inclined position.

Before the 1st use of the analyser, a full charge of the battery must be made during 12 hours.

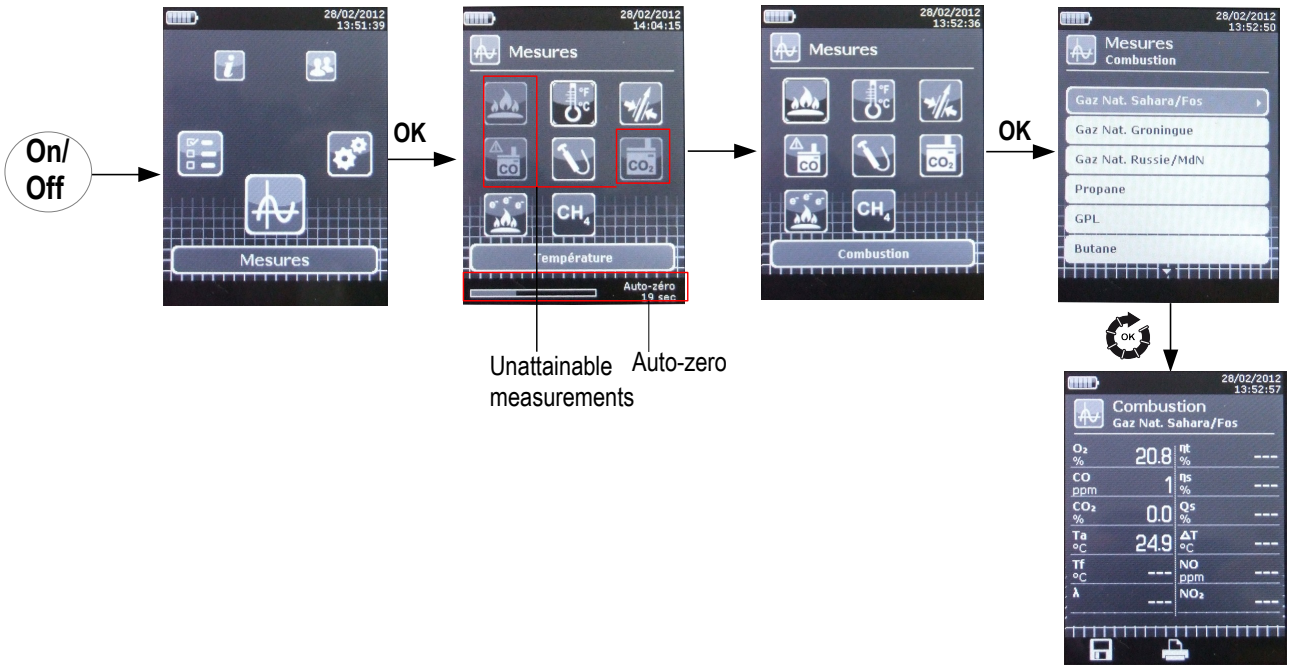
Empty the water trap.

In case of any default or damage of the instrument, Kimo After sales service shall be contacted. On the back of the analyser, there is a label with the analyser serial number. This number shall be communicated for every operation (technical operation or request of spare parts).

3.2. Perform an analysis



- Connect the flue gas probe to the analyser.
- Turn on the instrument.
  Home screen is displayed with measurement menu at the forefront.
- Insert the probe in the flue as show on the figure for at least 3 minutes.
- Press **OK**.
  The screen with the different possible measurements is displayed. Remaining time of autozero and its progress bar are displayed at the bottom of the screen.
  Measurements covered by the autozero are not available (Combustion, COmax and CO_2 ambient). At the end of the autozero, these menus are available. Take advantage of the autozero to perform the draft.
- Go to **"Combustion"** with the rotative button.
- Press **OK**.
  The screen displays the different combustibles in the analyser.
- Select the type of used combustible by the boiler with the rotative button.
- Press **OK**.
  The screen displays values of the different parameters of the analysis.



3.3. Assign the analysis to a customer

At the end of the analysis, when measurements are constant, it is possible to assign it to a customer recorded in the analyser or to unrecorded customer that should be created.

- Press the function button :
  The analyser displays the list of recorded customers.
- Select a customer with the rotative button then press **OK** or create a customer (see page 22) then select it.
  The analyser displays the list of available boilers.
- Select the boiler with the rotative button then press **OK** or create a boiler (see page 23) then select it.
  The analyser backs to the measurement screen of the analyse.

3.4. Print the analysis results

It is possible to print the results on the ticket :

- Press the function button .

  Results are printed on the ticket.

4. Set the different parameters of the analyser

The **"Settings"** menu allows to set the following parameters :

- Instrument (screen, printing, auto-extinction,...)
- Combustibles
- Measurement
- References (O_2, atmospheric pressure and altitude)
- AutoZ/Purge
- Operators

The "Settings" part allows to set parameters that can affect the performed measurements. These settings must be made by a qualified technician.

4.1. Set the instrument

4.1.1. Screen setting

This part allows to set brightness, contrast and backlight of the screen from 1 to 9.

- Turn on the instrument.
  Home screen is displayed with measurement menu at the forefront.
- Go to **"Settings"** with rotative button then press **OK**.
- Go to **"Instrument"** then press **OK**.
  The screen with the different parameters to set (brightness, contrast and backlight) is displayed.
- Press **OK**.
  The screen with the settings to perform appears.
- Go to the set to perform with the rotative button then press **OK**.
  The name of the setting appears in black on blue background.
- Turn the rotative button on the left to decrease **brightness, contrast or backlight** or turn the rotative button on the right to increase it.

4.1.2. Set the auto-extinction

The auto-extinction turn off the analyser automatically after some time of non-use.
It is possible to set the auto-extinction at 15 / 30 / 45 / 60 / 90 or 105 minutes or to deactivate it.

"Settings instrument" *screen is displayed.*

- Go to **"Auto-extinction"** with the rotative button then press **OK**.
- Select the required time of auto-extinction or **"Off"** to deactivate it with the rotative button.
- Press **OK**.

4.1.3. Change the language

It is possible to select the language of the instrument : French or English

"Settings instrument" *screen is displayed.*

- Go to **"Language"** with the rotative button then press **OK**.
- Select the language with the rotative button.
- Press **OK**.

4.1.4. Modify date and time

"Settings instrument" *screen is displayed.*

- Go to **"Date/time"** with the rotative button then press **OK**.
- Go to the parameter to modify with the rotative button (day, month, year, hour, minute or second).
- Press **OK**.
- Turn the rotative button to modify the selected parameter.
- Press **OK**.
- Repeat the procedure on another parameter if required.

- Go to **"Date Format"** with the rotative button then press **OK**.
- Select **« Day/Month »** to display the day then the month or **"Month/Day"** to display the month then the day then press **OK.**
- Go to **"Time Format"** with the rotative button then press **OK**.
- Select the time format : **"12"** or **"24".**
  *If 12 is selected, **"AM"** for ante meridiem or **« PM »** for post meridiem will be displayed in front of the time.*
- Press the **"Validate"** function key to quit the screen and save the modifications or press **Esc** to cancel.

4.1.5. Set the printing of tickets

***"Settings instrument"** screen is displayed.*

- Go to **"Printing"** with the rotative button then press **OK**.
- Go to **"Format"** with the rotative button then press **OK**.
- Select the ticket format : long or short with the rotative button then press **OK**.
  ***Long format ticket :** prints measurement results + header (operator name, date and time of the inspection, type of instrument and its serial number, address, telephone number.*
  ***Short format ticket :** prints only the measurement results and the instrument reference.*
- Go to **"Header"** then press **OK**.
  The keyboard appears at the bottom of the screen.
- Select the letters with the rotative button then press **OK**..
- Press the function key ☑ to validate the header.
  The keyboard disappears.
- Press **Esc** to back to **"Settings instrument"** screen and validate modifications.

- To go from lower-case keyboard to upper-case keyboard then to numeric keyboard : press the function key **aA1**.
- To erase a letter : press the function key ⌫ .

4.1.6. Activate or deactivate the visual help

The visual help corresponds to help windows displayed met during a measurement procedure.

***"Settings instrument"** screen is displayed.*

- Go to **"Help"** with the rotative button.
- Press **OK** to activate it : **ON** or to deactivate it : **OFF**.

4.2. Set the combustible

15 different combustibles are recorded in the analyser :

Sahara / Fos Natural gas
Groninguen – Natural gas
Russia – Natural gas
Propane
LPG
Butane
Light oil
Heavy fuel oil
Cannel-coal
Low volatile coal
Coke gas
Biofuel 5%
Wood 20%
Hog fuel 21%
Pellet 8%

4.2.1. Modify a combustible

Each combustible has its own coefficient allowing to calculate loses and efficiencies in the most accurate way.

The modification of these coefficients will lead some modifications in combustion analysis results. Only a qualified technician is authorized to modify them.
It is still possible to reset the factory parameters pressing or with Ligaz software. (see page 53).

***"Settings"** menu is displayed.*

- Go to **"Combustibles"** with the rotative button then press **OK**.
- Go to the type of of combustible with the rotative button then press **OK**.
- Go to the coefficient to modify with the rotative button then press **OK**.
  The keyboard appears.
- Select numbers with the rotative button and press **OK** to validate.
- Press ✔ to validate the new coefficient or **Esc** to cancel.
  Screen backs to the list of combustible.

- To erase a number : press function key ⌫
- To go from lower-case keyboard to upper-case keyboard then to numeric keyboard : press the function key **aA1**.

It is also possible to modify the name of a combustible and its type of energy (Solid, liquid or gas) :

"Settings > Combustibles" *screen is displayed.*

- Go to the combustible to modify with the rotative button.
- Press function key ✎.
- Press **OK** on **"Name"** line.
  The keyboard appears.
- Enter the name of the combustible with the rotative button and press **OK** to validate.
- Press ✔ to validate the name of the combustible.
- Press **OK** on **"Energy"** line.
- Select the type of energy for the combustible : solid, liquid or gas then press **OK**.
- Press function key 💾 to save the modifications.
  Screen backs to the list of combustible with the added modifications.

4.2.2. Add a combustible

Up to 5 combustibles can be added in the instrument's memory :

"Settings > Combustibles" *screen is displayed.*

- Press function key 🔥+.
  *"**Add combustible"** screen is displayed.*
- Press **OK**.
  The keyboard appears.
- Enter the name of the combustible with the rotative button and press **OK** to validate.
- Press ✔ to validate the name of the new combustible.
- Go to **"Energy"** line with the rotative button and press **OK**.
- Select **"Solid"**, **"Liquid"** or **"Gas"** with the rotative button and press **OK**.
- Press function key 💾 to save the new combustible.
  Screen backs to the list of combustible. The new combustible in well on the list in last position.
  Every coefficient of the new combustible are set at 0.
- Follow the procedure of modification of combustible coefficients above-mentionned to add them.

4.2.3. Delete a combustible

"Settings > Combustibles" *screen is displayed.*

- Go to the combustible to delete with the rotative button.
- Press function key 🔥×.

4.3. Set the alarms, measurement units and CO protection

It is possible to activate an alarm for each measurement parameter. This alarm can be **rising** (the alarm of the instrument is activated when the measured value exceeds the defined threshold) or **falling** (the alarm of the instrument is activated when the measured value is below the defined threshold).
It is possible to set an alarm for the following parameters :

- O_2, CO, Co amb, CH_4, CO_2, Qs (losses), λ (Excess air), ηt (lower efficiency), ηs (higher efficiency), Tf (flue gas temperature), Ta (ambient temperature), Td (dewpoint temperature), Pr. (pressure), ΔP (differential pressure), Draft

4.3.1. Set the alarms

Settings" *menu is displayed.*

- Go to **"Measurement"** with the rotative button then press **OK**.
- Press **OK** on **"Alarms"** line.
- Go to the parameter to modify with the rotative button then press the function key .
  The edge (rising or falling) and the threshold of the selected parameter are displayed.
- Go to **"Edge"** line with the rotative button then press **OK**.
- Select the type of alarm with the rotative button :
  - Rising edge :
  - Falling edge :
  - Deactivated alarm :
- Press **OK**.
- Go to **"Threshold"** line then press **OK**
  The keyboard appears.
- Enter the alarm threshold value with the rotative button and press **OK** to validate.
- Validate the threshold with the right function key .
- Validate the modifications with the function key .
- Press **Esc** to quit the screen.

4.3.2. Set measurement units

It is also possible to select the measurement unit for each measured parameter :

- **Temperature :** °C, °F
- **Pressure :** Pa, inWg, hPa, mbar, mmHg, mmH_2O, PSI
- **CO / CO_2 / NO / NO_2 / NOx / SO_2 :** ppm, mg/m^3, mg/kWh, g/kWh, g/GJ, g/m^3, %
- **CH_4 :** ppm, %vol, %LIE

"Settings" *menu is displayed.*

- Go to **"Measurement"** with the rotative button then press **OK**.
- Go tor **"Units"** with the rotative button then press **OK**
- Go to the parameter to modify with the rotative button then press **OK**.
  The list of the available units according the parameter appears.
- Go to the requested unit with the rotative button then press **OK**.
- Press **Esc** to quit the screen.

4.3.3. Set the CO protection threshold

The CO protection allows to protect the instrument against high concentrations of CO. Above the threshold, the instrument will stop the measurement of CO but the others measurements will stay possible. To set this threshold :

"Settings" *menu is displayed.*

- Go to **"Measurement"** with the rotative button then press **OK**.
- Go to **"CO protection"** with the rotative button then press **OK.**
- Press the function key to modify the threshold.
- Enter the requested threshold then press the function key to validate the threshold.
- Press **Esc** to quit the screen.

4.4. Set the references

Settings>References screen allows to set the features of the measurement environment : O_2 reference, altitude and atmospheric pressure. These data are used to calculate the efficiency.

These settings must be performed by a qualified technician.

"Settings" *screen is displayed.*

- Go to **"Reference"** with the rotative button then press **OK**.

- Select the parameter to modify with the rotative button then press **OK**.
  The keyboard appears.
- Enter the parameter value with the rotative button then press **OK** to validate.
- Validate the parameter value with the function key ✔.

4.5. Set the duration of autozero and purge time

The autozero allows the analyser to exhaust ambient fresh air and as a result to put the sensors at 0 ppm.

"Settings" *screen is displayed.*

- Go to **"Autozero"** line with the rotative button then press **OK**.
- Press **OK**.
  The list of available duration appears.
- Go to the required duration then press **OK**.
- Press **Esc** to quit the screen.

4.6. Set the operators

It is possible to enter in analyser names of operators who will use the instrument. The operator who performs an analysis appears on the ticket (only for the long size).

4.6.1. Add an operator

"Settings" *screen is displayed.*

- Go to **"Operator »** with the rotative button then press **OK**.
- Press the function key .
  The keyboard appears.
  Enter the name with the rotative button : press **OK** to validate.
- Press the function key ✔ to validate the operator name and to add it in the list.
  The analyser backs to the list of present operators.
- Press **Esc** to quit the screen.

4.6.2. Modify the operator name

"Settings" *screen is displayed.*

- Go to **"Operator"** with the rotative button then press **OK**.
- Press the function key .
  The keyboard appears.
- Modify the name with the rotative button : press **OK** to validate.
- Press the function key ✔ to validate the operator name.
  The analyser backs to the list of current operators.
- Press **Esc** to quit the screen.

4.6.3. Delete an operator

Settings" *screen is displayed.*

- Go to **"Operator"** with the rotative button then press **OK**.
- Go to the operator to delete with the rotative button.
- Press the function key .
- Press **Esc** to quit the screen.

4.7. Reset the Factory settings of the analyser

It is possible to reset set the analyser with its factory settings.

"Settings" *screen is displayed.*

- Press the function key .
  A message is displayed and asks to confirm the return to factory settings.
- Go to **"OK"** with the rotative button then press **OK**.

To cancel this return to factory settings when the **"Back to factory setting"** message is displayed :

➢ Press **Esc** or go to **"Cancel"** with the rotative button then press **OK**.

4.7.1. Units and values of measurement settings of the factory settings

- **Temperature :** °C
- **Draft :** Pa
- **Differential pressure :** mbar
- **CO :** ppm
- **CO_2 :** %
- **NO :** ppm
- **NOx :** ppm
- **CH_4 :** ppm
- **CO (O_2) :** mg/m^3
- **NO (O_2) :** mg/m^3
- **NOx (O_2) :** mg/m^3

Alarm threshold :

- **O_2 :** 3.0%
- **CO :** 100 ppm
- **CO amb :** 20 ppm
- **CH_4 :** 1200 ppm
- **Excess air (λ) :** 1.10
- **Flue gas temperature (Tf) :** 250.0°C

Reference :

- **O_2 :** 21.0%
- **Altitude :** 800 m
- **Atmospheric pressure :** 1013.25 hPa

Duration of autozero and purge : 1 minute

Created operators and combustibles will be deleted. Created customers and boilers and inspections on boilers are not deleted after a return to factory settings.

5. Manage customers

It is possible to save names and addresses of different customers clients in the analyser. The performed measurements could be assigned to them. It is possible to create up to 100 customers.

5.1. Manage a customer

- Turn on the analyser.
- Go to **"Customers"** with the rotative button then **OK**.
- Press the function key .
  "Add customer" *screen is displayed.*
- **Press OK** on **"Name"** line.
  The keyboard appears.
- Enter the customer name with the rotative button and press **OK** to validate the letters.
- Press the function key .
  The analyser backs to ***"Add customer"*** *screen.*
- Go to the 1st line of the address with the rotative button then press **OK**.
- Enter the 1st line of the customer's address with the rotative button and press **OK** to validate letters.
- Press the function key .
  The analyser backs to ***"Add customer"*** *screen.*
- Go to the 2nd line of the address with the rotative button then press **OK**.
- Enter the 2nd line of the customer's address with the rotative button and press **OK** to validate letters.
- Press the function key .
  The analyser backs to ***"Add customer"*** *screen.*
- Continue for both following lines of the address if necessary.
- Go to **"Tel"** line with the rotative button then press **OK**.
- Enter customer's telephone number with the rotative button and press **OK** to validate the letters.
- Press the function key .
  The analyser backs to ***"Customer List"*** *screen with the created new customer.*

When a customer has been created, it is possible to link to this customer one or several boilers. See chapter 5 to create, modify and delete a boiler.

5.2. Modify a customer

"Customers" *screen is displayed.*

- Go to the customer to modify with the rotative button then press **OK**.
- Press the function key .
  Details of the customer are displayed.
- Press the function key .
- Go to the line to modify with the rotative button then press **OK.**
  The keyboard appears.
- Make the changes.
- Press the function key to validate.
  The analyser backs to ***"Customer detail"*** *screen.*
- Press the function key once all the changes have been made.

5.3. Delete a customer

"Customer" *screen is displayed.*

- Go to the customer to delete with the rotative button then press **OK**.
- Press the function key .
  A message appears asking to confirm the deletion of the customer.
- Go to **YES** then press **OK** to confirm the deletion of the customer.
- Go to **NO** then press **OK** to cancel.

6. Manage boilers

A boiler is compulsorily linked to a customer, at least one customer must be created to create a boiler. See chapter 4 for the creation of a customer. It is possible to link up to 10 boilers per customer.

6.1. Create a boiler

The list of customers saved in the analyser is displayed.

- Go to the customer which will be linked to the boiler with the rotative button then press **OK**.
- Press the function key .
- Press **OK** on **"Model"** line.
  The keyboard appears.
- Enter the model of the boiler with the rotative button then press **OK** to validate the letters.
- Press to validate the model.
  *The analyser backs to **"Add boilers"** screen.*
- Do the same for **"Brand", "Address", "Location"** and **"Air pulsed burner".**
- Press OK on **"Tightness"** line, select **"B Type" (untight)** or **"C Type" (tight)** then press **OK**.
- Press OK on **"Combust."** line, select the type of combustible for the boiler then press OK.
- Press OK to tick the **"Air pulser burner"** box if the boiler has one.
- Press the function key to save the boiler features.

The analyser backs to the list of boilers.

6.2. Modify a boiler

The list of boilers saved in the analyser is displayed.

- Go to the boiler to modify with the rotative button then press **OK**.
- Press the function key .
  Details of the boiler are displayed.
- Press the function key .
- Go to the line to modify with the rotative button then press **OK**.
  The keyboard appears.
- Made the changes.
- Press the function key to validate.
  *The analyser backs to **"Modify boiler"** screen.*
- Press the function key once all the changes have been made.

6.3. Delete a boiler

The list of boilers saved in the analyser is displayed.

- Go to the boiler to delete with the rotative button then press **OK**.
- Press the function key .
  A message appears asking to confirm the deletion of the boiler.
- Go to **YES** then press **OK** to confirm the deletion of the boiler.
- Go to **NO** then press **OK** to cancel.

7. Manage the inspections

Each saved inspection is linked to a customer. It is possible to see the details of an inspection, to add one or to delete one. Available inspections in the analyser are the following : combustion, ambient temperature, flue gas temperature, internal temperature, Flow/Return temperature, dewpoint temperature, draft pressure, differential pressure, flue gas velocity, CO max, opacity, ambient CO_2, ionisation current, leak detection, gas network tightness and gas flow.
The maximum number of inspection is 10 per boilers.

7.1. Get to inspections

To find every inspections of a customer and details of this inspection, follow the specified procedure :

The list of customers saved in the analyser is displayed.

- Go to the required customer then press **OK**.
  Every boilers linked to this customer are displayed.
- Go to the required boiler then press **OK**.
  Every inspections linked to this customer and boiler are displayed.
- Go to the required inspection then press **OK**.
  Details of the inspection are displayed.

7.2. Create an inspection

It is possible to create an inspection for specific customer that will be performed later.

The list of customer's inspections is displayed.

- Press the function key to add an inspection.
  A list of inspections is displayed.
- Go to the required inspection then press **OK**.
  *The inspection is added with **"Not done"** mention.*

7.3. Delete an inspection

To delete an inspection of a customer :

The list of customer's inspections is displayed.

- Press the function key to delete an inspection.
- Go to **YES** then press **OK** to delete the inspection or go to **NO** then press **OK** to cancel.

8. Perform measurement of a customized procedure

Customized procedures, created by the Logaz software (optional software), when they are transferred in the analyser can be performed.

8.1. Preliminary operations to procedures

Before performing the measurements, names of the different customers and theirs respective boilers must be saved in the analyser. See page 22 to create customers and page 23 to create boilers or the Logaz software user manual (optional software).

8.2. Launch a customized procedure

- Turn on the analyser.
- Go to **"Procedures"** with the rotative button then press OK.
- Select the customer then the boiler in which measurements will be performed.
- Go to **"Customized"** with the rotative button then press OK.
  The list of procedures saved in the analyser is displayed.
- Select the procedure with the rotative button then press OK.
  The analyser displays the 1st step of the customized procedure.
- Go to **"Start"** with the rotative button then press OK.
  The analyser performs the measurement.
- Press OK on **"Next"** if the customized procedure has several step.
  The analyser launches the next step.
  OR
- Press OK on **"Quit"** if the customized procedure has only one step.

The analyser backs to the list of customized procedures. At the end of the procedure, the analyser saves it and automatically links it to the customer and boiler selected before launching the measurement. It is possible to get to details of this procedure in the **"Customer"** menu.

9. Perform a control of gas flow

9.1. Perform a measurement of theoretical flow

- Turn on the analyser.
- Go to **"Procedures"** menu with the rotative button then press **OK**.
  *The analyser asks to select a customer : go to **"OK"** then press **OK**.*
  The list of customers is displayed.
- Select the customer then press **OK**.
  The list of boilers is displayed.
- Select the boiler then press **OK**.
  ***"Procedure"** screen is displayed.*
- Go to **"Gas flow"** with the rotative button then press **OK**.
  *A message indicating **"Step 1 : Theoretical flow"** is displayed.*
- Go to **"Next"** then press **OK.**
  ***« Theoretical flow »** screen is displayed.*
- Specify the power capacity of the boiler in kW (data on the information plate of the boiler) : go to each number, press **OK**, turn the rotative button to **increment** or **decrement** the number then press **OK** to validate.
- Make the same operation to select the standard : **NF** or **CE**.
- Make the same operation to select the gas type : **GAZ H**, **GAZ B**, **BUTANE** or **PROPANE**.
- Press the function key ✔ to validate.
  *A message indicating **"Step 2 : Real flow"** is displayed.*

The theoretical flow is calculated according to a power capacity in kW of the boiler, the standard of the boiler (CE or NF standard), the gas type (Gaz H, Gaz B, butane or propane) and according to a coefficient. Table below allows to calculate this flow according to the power capacity :

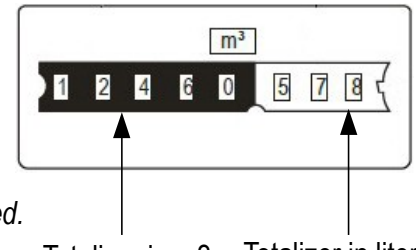
Standard	GAZ H (19-21 mbar)	GAZ B (25 mbar)	Butane	Propane
NF	Pu/KW x 2,166	Pu/KW x 2,519	Pu/KW x 0,651	Pu/KW x 0,843
CE	Pu/KW x 1,927	Pu/KW x 2,241	Pu/KW x 0,579	Pu/KW x 0,750

9.2. Perform a measurement of real flow

The measurement of the theoretical flow must performed previously
*A message indicating **"Step 2 : Real flow"** is displayed.*

- Go to **"Next"** then press **OK**.
  ***"Start index (L)"** is displayed.*
- Specify the start flow indicated on the gas meter : go to each number, press **OK**, turn the rotative button to **increment** or **decrement** the number then press **OK** to validate.
- Press the function key ✔ to validate.
  *A message indicating **« Step 2 : Wait : 2 min. »** and a progress bar are displayed.*
- Wait for 2 minutes.
  *It is possible to cancel this measurement : press **OK**.*
- Go to **"Next"** then press **OK** at the end of the 2 minutes.
  ***"End index (L)"** screen is displayed.*
- Specify the end flow indicated on the gas meter : go to each number, press **OK**, turn the rotative button to **increment** or **decrement** the number then press **OK** to validate.
- Press the function key ✔ to validate.
  A message displays the flow measurement result.

Read a gas meter :



When the measurement is finished :

- Press **OK**.
  The analyser asks to save the measurement result.
- Go to **YES** or **NO** then press **OK**.
  The analyser asks to print the measurement result.
- Go to **YES** or **NO** then press **OK**.

9.3. Results interpretation

The analyser displays the flow result by the following :

- **OK :** lower or equal to 10%
- **A1 :** between 10.1 and 20%
- **A2 :** greater than 20%

10. Perform a gas network leak test

To perform this test, it is necessary to have a gas network leak testing kit. This kit is available as option (ref : KEG).

10.1. Perform the test

- Connect the different items of the kit on the network to test (see user manual of the KEG).
- Turn on the analyser.
- Go to **"Procedures"** menu with the rotative button then press **OK**.
  *The analyser asks to select a customer and a boiler : go to **"OK"** then press **OK**.*
  The list of customers is displayed.
- Select the customer then press **OK**.
  The list of boiler is displayed.
- Select the boiler then press **OK**.
  ***"Procedures"** screen is displayed.*
- Go to **"Network tightness"** with the rotative button then press **OK**.
  *A message indicating **"Plug silicone tube on P+"** is displayed.*
- Plug the silicone tube on P+ pressure tap then press **OK**.
  *A message indicating **"Pressurize to 50 mbar"** is displayed.*
- Pressurize the network to 50 mbar then press **OK**.
  *A message indicating **"Please wait 10 minutes"** and a progress bar are displayed.*
  At the end of the 10 minutes, results are displayed :
  - *start pressure*
  - *end pressure*
  - *possible loss of pressure*

10.2. Link the measurement to a customer

When the measurement has been performed, it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.

- Press the function key to save it.
  The analyser displays the list of registered customers.
- Select a customer with the rotative button then press **OK** or create a new customer (see page 22) then select it.
  The analyser displays the list of available boilers.
- Select the boiler with the rotative button then press **OK** or create a boiler (see page 23) then select it.
  The analyser backs to the screen of draft measurement.

10.3. Print the measurement on the ticket

It is possible to print on the ticket the network tightness :

- Press the function key .
  Value is printed on the ticket.

11. Perform a draft measurement

The draft measurement allows to check if the flue of the boiler correctly clears flue gas caused by the combustion.

11.1. Perform the measurement

- Connect the flue gas probe on the analyser.
- Turn on the analyser.
- Go to **"Measurement"** menu with the rotative button then press **OK**.
  The analyser performs the autozero : remaining time and a progress bar display on the screen.
- Go to **"Pressure"** with the rotative button then press **OK.**
- Go to **"Draft pressure"** with the rotative button then press **OK.**
  Measurement launches and the analyser displays the draft.

11.2. Link the measurement to a customer

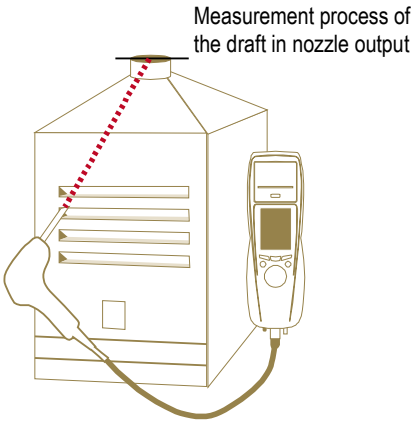
When the measurement has been performed and is stable, it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.

- Press the function key to save.
  The analyser displays the list of registered customers.
- Select a customer with the rotative button then press **OK** or create a new customer (see page 22) then select it.
  The analyser displays the list of available boilers.
- Select the boiler with the rotative button then press **OK** or create a boiler (see page 23) then select it.
  The analyser backs to the screen of draft measurement.

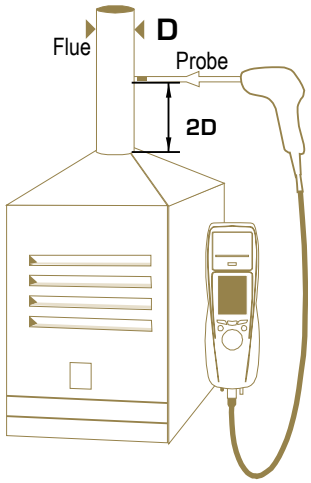
11.3. Print the measurement on the ticket

When the measurement is stable, it is possible to print it on the ticket.

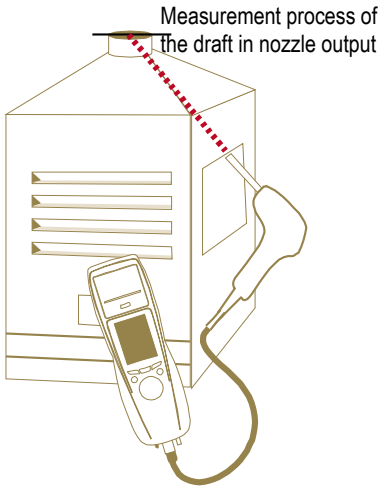
- Press the function key to print it.
  The value is printed on the ticket.



Put the probe of the KIGAZ 200 in the draft hood, going through the front face of the boiler.



Put the probe of the KIGAZ 200 in the nozzle output, from the beginning of the connecting flue.



Put the probe of the KIGAZ 200 in the draft hood, going through the side openings of the boiler.

12. Perform a measurement of ambient CO_2

12.1. Perform the measurement

- Connect a CO_2 probe (available as option) on C1 connection on the top of the analyser.
- Turn on the analyser.
- Go to **"Measurement"** menu with the rotative button then press **OK**.
  The analyser performs the autozero : remaining time and a progress bar display on the screen.
- Go to **"Ambient CO_2"** with the rotative button then press **OK**.
  Measurement launches and the analyser displays the level of ambient CO2.

12.2. Link the measurement to a customer

When the measurement has been performed, it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.

- Press the function key to save.
  The analyser displays the list of registered customers.
- Select a customer with the rotative button then press **OK** or create a new customer (see page 22) then select it.
  The analyser displays the list of available boilers.
- Select the boiler with the rotative button then press **OK** or create a boiler (see page 23) then select it.
  The analyser backs to the screen of measurement of ambient CO_2.

12.3. Print the measurement on the ticket

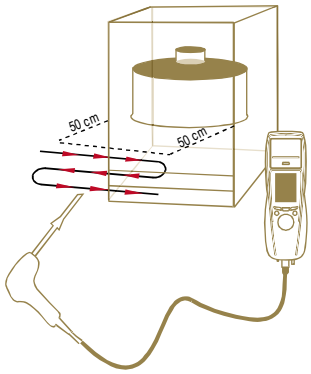
When the measurement is stable, it is possible to print it on the ticket.

- Press the function key to print it.
  The value is printed on the ticket

13. Perform a measurement of max CO

13.1. Perform the measurement

- Connect a CO probe (available as option) on C1 connection on the top of the analyser or connect the flue gas probe on the single connector on the bottom of of the analyser.
- Turn on the analyser.
- Go to **"Measurement"** menu with the rotative button then press **OK**.
  The analyser performs the autozero : remaining time and a progress bar display on the screen.
- Go to **"Max CO"** with the rotative button then press **OK**.
- Press **OK** to launch the measurement.
  The measurement is launched, the instrument displays the level of CO and the level of max CO.
  When the measurement duration is finished, the analyser displays the value of CO maximum during the measurement.



The default measurement duration is **30 s**. It is possible to change this duration before starting the measurement :

- On max CO screen, before pressing OK to start the measurement, press the function key .
  "Duration" *screen is displayed.*
- Press **OK**.
- Use the rotative button to select the required measurement duration : **30 / 40 / 50 s** or **1 / 2 / 3 / 4 / 5 minutes.**
- Press **OK** to validate the measurement duration.
- Press **Esc** to back to the screen of measurement start of max CO.

13.2. Link the measurement to a customer

At the end of the measurement, it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.

- Press the function key to save.
  The analyser displays the list of registered customers.
- Select a customer with the rotative button then press **OK** or create a new customer (see page 22) then select it.
  The analyser displays the list of available boilers.
- Select the boiler with the rotative button then press **OK** or create a boiler (see page 23) then select it.
  The analyser backs to the screen of max CO measurement.

13.3. Print the measurement on the ticket

At the end of the measurement, it is possible to print it on the ticket.

- Press the function key to print it.
  The value is printed on the ticket

14. Perform some temperature measurements

14.1. Perform a measurement of ambient temperature

- Connect a probe of Pt100 temperature (available as option) on C1 connection on the top of the analyser.
- Turn on the instrument.
  Home screen is displayed with measurement menu at the forefront.
- Press **OK**.
  The analyser performs the autozero : remaining time and a progress bar display on the screen. However it is possible to reach the temperature menu during the autozero.
- Go to **"Ambient Temp."** with the rotative button then press **OK**.
  The temperature detected by the Pt100 probe is displayed on the analyser.

14.2. Perform a measurement of flue gas temperature

- Connect the flue gas probe on the analyser.
- Turn on the analyser..
  Home screen is displayed with measurement menu at the forefront.
- Press **OK**.
  The analyser performs the autozero : remaining time and a progress bar display on the screen. However it is possible to reach the temperature menu during the autozero.
- Go to **"Flue gas Temp."** with the rotative button then press OK.
  The screen displays the flue gas temperature detected by the thermocouple probe of the flue gas probe.

14.3. Perform an ambient temperature measurement with the internal sensor

- Turn on the instrument.
  Home screen is displayed with measurement menu at the forefront.
- Press **OK**.
  The analyser performs the autozero : remaining time and a progress bar display on the screen. However it is possible to reach the temperature menu during the autozero.
- Go to **"Internal Temp."** with the rotative button then press **OK**.
  The screen displays the NTC temperature detected by the analyser.

14.4. Perform a dewpoint temperature measurement

The dewpoint temperature is measured during a flue gas analysis.

- Connect the flue gas probe.
- Turn on the instrument.
  Home screen is displayed with measurement menu at the forefront.
- Press **OK**.
  The analyser performs the autozero : remaining time and a progress bar display on the screen.
  When the autozero is finished :
- Press **OK** on **"Flue gaz analysis".**
- Select the combustible of the boiler then press **OK**.
  The flue gas analysis is ongoing.
- Turn the rotative button to reach the screen where dewpoint temperature is displayed.

14.5. Link the measurements to a customer

When the measurement has been performed, it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.

- Press the function key 🖫 to save.
  The analyser displays the list of registered customers.
- Select a customer with the rotative button then press **OK** or create a new customer (see page 22) then select it.
  The analyser displays the list of available boilers.

- Select the boiler with the rotative button then press **OK** or create a boiler (see page 23) then select it.
  The analyser backs to the screen of temperature measurement.

14.6. Print the measurement on the ticket

At the end of the measurement, it is possible to print it on the ticket.

- Press the function key to print it.
  The value is printed on the ticket.

15. Perform a measurement of opacity

It is possible to enter in the analyser from 1 to 3 opacity indexes performed thanks to opacity pump available as option. The opacity index consists of the measurement of solid waste of combustion in the flue with a pump and a filter of measurement. The filter coloration is compared with a table reference composed by 10 greyed areas numbered from 0 to 9.

15.1. Perform the measurement

Preliminary operation :
To avoid the condensation in the pump, it is necessary to breathe in WITHOUT FILTER fresh air before perform a measurement.

- Put the paper filter in the pump.
- Pump out flue gas in the middle of the flue.
  The necessary gas volume for a measurement of opacity corresponds to about 10 pump aspirations.
- Compare the filter clogging to the reference table to determine the opacity index.
- Make the same operation several times if necessary, replace the filter each time.

15.2. Enter the indexes in the analyser

When the measurement of opacity has been performed, enter the opacity indexes in the analyser :

- Turn on the analyser.
  The analyser performs the autozero : remaining time and a progress bar display on the screen. However it is possible to reach the Bacharach index menu during the autozero.
- Press **OK**.
- Go to **"Bacharach index"** with the rotative button.
- Press **OK**.
- Press **OK** on "**Index 1"** line.
- Increment the index from 0 to 9 with the rotative button.
- Press **OK**.
- Repeat the procedure for 2 and 3 indexes.
  *The analyser indicates the opacity indexes average on **"Average"** line at the bottom of the screen.*

15.3. Link the index to a customer

When the average has been performed, it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.

- Press the function key to save.
  The analyser displays the list of registered customers.
- Select a customer with the rotative button then press **OK** or create a new customer (see page 22) then select it.
  The analyser displays the list of available boilers.
- Select the boiler with the rotative button then press **OK** or create a boiler (see page 23) then select it.
  The analyser backs to the screen about the opacity.

15.4. Print the index on the ticket

At the end of the measurement, it is possible to print it on the ticket.

- Press the function key to print it.
  The value is printed on the ticket.

16. Perform a measurement of ionisation current

The measurement of ionisation current allows to check the presence of the flame. In standard operation, the ionisation probe produces a currant of a few µA or a few dozen of µA. In case of lack of flame, this current is not present anymore (measurement : 0 µA), the safety equipments of the boiler cut off the power supply.

16.1. Perform the measurement

- Connect a ionisation current probe on C1 connection of the analyser.
- Turn on the analyser.
  Home screen is displayed with measurement menu at the forefront.
- Press **OK**.
  The analyser performs the autozero : remaining time and a progress bar display on the screen. However it is possible to reach the ionisation current menu during the autozero.
- Go to **"Ionisation current"** with the rotative button then press **OK**.
- Connect the ends of the probe on the boiler.
  The measured ionisation current is displayed on the analyser. This value must be equal to several dozen of µA.

16.2. Link the measurement to a customer

When the measurement has been performed,it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.

- Press the function key to save.
  The analyser displays the list of registered customers.
- Select a customer with the rotative button then press **OK** or create a new customer (see page 22) then select it.
  The analyser displays the list of available boilers.
- Select the boiler with the rotative button then press **OK** or create a boiler (see page 23) then select it.
  The analyser backs to the screen of ionisation current measurement.

16.3. Print the measurement on the ticket

At the end of the measurement, it is possible to print it on the ticket.

- Press the function key to print it.
  The value is printed on the ticket.

17. Perform a CH_4 measurement

There are 2 possibilities to measure CH_4 :

- Thanks to the internal sensor (optional)
- Thanks to an external probe (SDFG option probe)

17.1. Perform the measurement with the probe

- Connect a CH_4 probe on C1 connection on the bottom of the analyser.
- Turn on the analyser.
- Go to **"Measurement"** menu with the rotative button then press **OK**.
  The analyser performs the autozero : remaining time and a progress bar display on the screen. However it is possible to reach the gas leak detection menu during the autozero.
- Go to **"Gas leak detection"** with the rotative button then press **OK**.
- Press **OK** to launch the measurement.
  If the probe is connected for more than 1 minute, the measurement screen appears and indicates the concentration and places it on a bargraph.
  If the probe has just been connected, the screen indicates the remaining time of warming.
  The measurement begins, the analyser displays the CH_4 level.

17.2. Perform the measurement with the sensor

- Turn on the analyser.
- Go to **"Measurement"** menu with the rotative button then press **OK**.
  The analyser performs the autozero : remaining time and a progress bar display on the screen.
- Go to **"Combustion"** with the rotative button then press **OK**.
  The analyser launches the combustion analyse. The measured CH_4 value appears at the bottom right of the screen.

17.3. Link the measurement to a customer

When the measurement has been performed, ,it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.

- Press the function key to save.
  The analyser displays the list of registered customers.
- Select a customer with the rotative button then press **OK** or create a new customer (see page 22) then select it.
  The analyser displays the list of available boilers.
- Select the boiler with the rotative button then press **OK** or create a boiler (see page 23) then select it.
  The analyser backs to the screen CH_4 measurement.

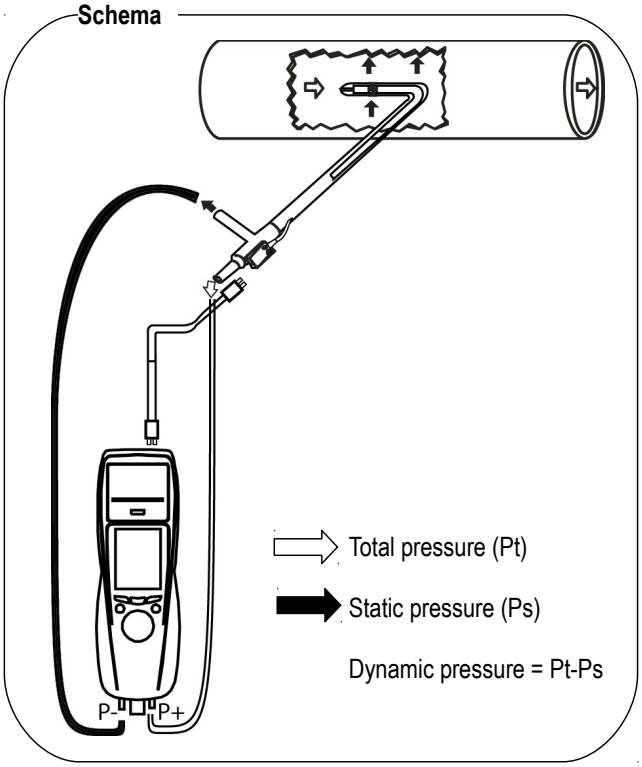
17.4. Print the measurement on the ticket

When the measurement is stable, it is possible to print it on the ticket.

- Press the function key to print it.
  The value is printed on the ticket

18. Perform a measurement with a Pitot tube

The used Pitot tube must be a Pitot tube type L with K thermocouple connection.



The Pitot tube must be introduced perpendicularly, in the middle into the duct and parallel to the flow.
The head (ending with an ellipsoidal nose) must be maintained parallel and facing the flow.
The total pressure (+) catched by the nose, is connected to the **P+** at the bottom of the analyser.
The static pressure (-) catched by the holes of the head, is connected to the **P-** at the bottom of the analyser.
The connection cable of the thermocouple K probe is connected to the T1 thermocouple K inlet of the top of the analyser.

If the K thermocouple is not connected, no value will be displayed.

When the connections are made :

- Turn on the analyser.
- Go to **"Measurement"** menu then press OK.
- Go to **"Pressure"** menu then press OK.
- Go to **"Draught Press."** then press OK.
  The analyser displays the measured values.

18.1. Link the measurement to a customer

When the measurement has been performed, it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.

- Press the function key to save.
  The analyser displays the list of registered customers.
- Select a customer with the rotative button then press **OK** or create a new customer (see page 22) then select it.
  The analyser displays the list of available boilers.
- Select the boiler with the rotative button then press **OK** or create a boiler (see page 23) then select it.
  The analyser backs to the measurement screen.

18.2. Print the measurement on the ticket

When the measurement is stable, it is possible to print it on the ticket : Press the function key to print it.

19. Get to information about the analyser

The **"Information"** menu of the analyser allows to get to several information :

- type of analyser
- version of the firmware
- serial number of the analyser
- phone and fax numbers, email of Kimo Instrument
- options of the analyser
- type of sensor, its serial number and its installation date.

To get to this menu :

From the home screen :

- Go to **"Information"** menu with the rotative button then press **OK**.
  The information is displayed on the screen.
- Use the rotative button to go from one screen to the other.

From any information screen :

- Press the function key .
  The analyser displays information about sensors.

20. Maintenance of the analyser

20.1. Life-time of the sensors

Sensors are electrochemical type : inside them, in the presence of gas to detect, a chemical reaction occurs that causes an emission of electrical current. The electric current strength detected by the instrument is converted into a corresponding gas concentration. The life-time of the sensor is strongly linked to the reagent consumption present in the sensor. As their consumption increases, features of the sensor are getting worse until their exhaustion, after which it is necessary to replace it. To ensure the measurement accuracy, sensors have to be calibrated on ly in Assistance centre qualified by Kimo.

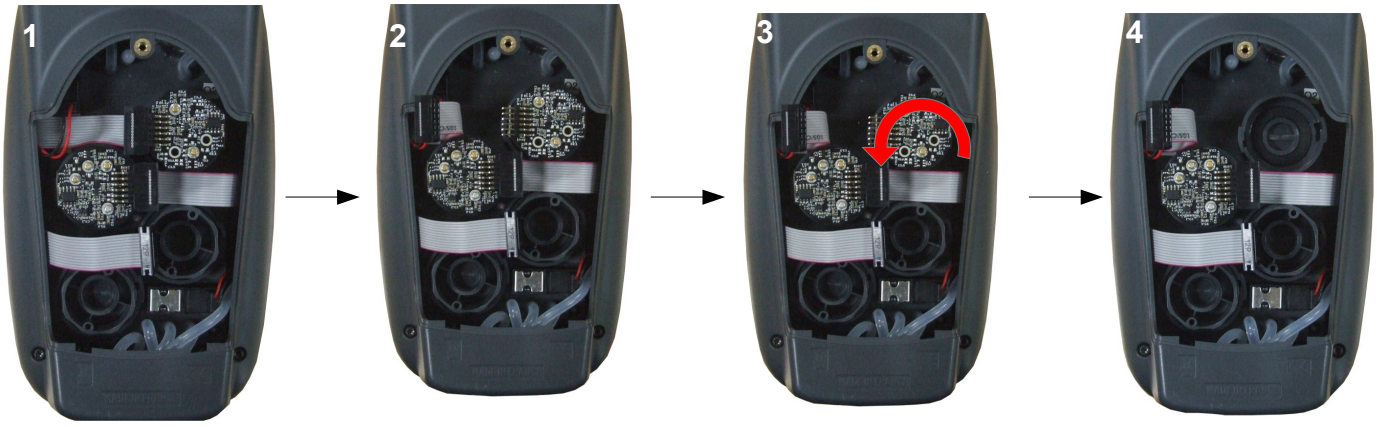
Sensors	Average life-time	Required calibration
O_2	2 years	Annual
CO-H_2	From 2 to 3 years	Annual
NO	From 2 to 3 years	Annual
CH_4	From 3 to 5 years	Annual

20.2. Replace the sensors

Follow this procedure to replace an used sensor :

The analyser must be turned off.

- Remove the protective cover.
- Turn the analyser.
- Unscrew the sensors cover with a crosshead screwdriver.
- Remove the trap.
- Disconnect the ribbon cable of the sensor to replace.
- Rotate the sensor counter clockwise taking care not to bring pressure on the board of the sensor.
- Remove the sensor.
- Put the new sensor taking care to insert the two jacket hooks of the sensor in their location.
- Rotate the sensor clockwise.
- Reconnect the ribbon cable of the sensor.

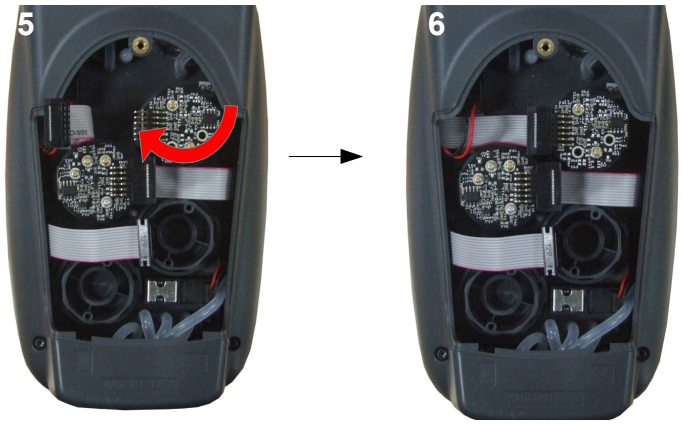


Sensors access

Disconnection of the ribbon cable of the sensor to replace

Sensor rotation

Remove the used sensor



Insertion of a new sensor then rotation of the sensor

Connection of the sensor ribbon cable

Sensors have very accurate locations, located as opposite picture :

- **O_2 sensor** is always in **1** position
- **CO sensor** is always in **2** position
- **NO and CH_4** sensors are always in **3** and **4** position.

When a sensor has been replaced, it is possible to check the proper functioning of this new sensor by going in the **"Information" menu** of the analyser. It is normal that a sensor that has just been installed gives the following message : **"Current Error"**, it is necessary to wait a few time to stabilize the polarization of the sensor.
Here are the stabilization times for each sensor :

- O_2 : 48 hours
- CO-H_2 : 48 hours
- NO : 48 hours
- CH_4 : 48 hours

20.3. Replace the paper roll of the printer

Follow this procedure to replace the paper roll of the printer :

- Raise the upper part of the printer.
- Put the paper roll in the required location.
- Pull up slightly on the paper : it must be caught between the upper part and the lower part of the printer.
- Close the upper part.

Some paper must be out from the slot situated between the lower part and the upper part of the printer part.

Both sides of the paper are different : the brightest side is the printed side and must faced the user.

Upper part to raise

Paper location

Introduction of the paper roll

Paper correctly introduced

20.4. Replace the battery

Follow this procedure to replace the battery :

The analyser must be turned off.

- Remove the protective cover.
- Turn the analyser.
- Unscrew the battery cover with a crosshead screwdriver.
- Remove the battery cover.
- Disconnect the battery.

Do not pull the cable, unplug softly the connector.

- Connect the new battery.

21. Calculations of the different parameters

21.1. CO and NO conversions

$$CO[\frac{mg}{mg^3}] = CO[ppm]\ x1.24922$$

$$NO[\frac{mg}{mg^3}] = NO[ppm]\ x1.33845$$

Conversions on units are the same for both gases. CO is taking as an example.
O2 reference (O_{2ref}) is only linked to CO and NO.

$$\lambda = \frac{CO_{2max}}{CO_2} = \frac{21}{21 - O_2}$$

$$CO[\frac{mg}{kWh}] = CO[\frac{mg}{m^3}]\lambda \frac{V_f}{PCIx0.277778}$$

$$CO[\frac{g}{kWh}] = CO[\frac{mg}{m^3}]\lambda \frac{V_f}{PCIx0.277778}\ x0.001$$

$$CO[\frac{g}{GJ}] = CO[\frac{mg}{kWh}]\lambda \frac{V_f}{PCIx0.277778}\ x0.001$$

$$CO[\frac{mg/m^3}{O_{2ref}}] = CO[\frac{mg}{m^3}]\ x\ \frac{21 - O_{2ref}}{21 - O_2}$$

$$CO[\frac{ppm}{O_{2ref}}] = CO[ppm]\ x\ \frac{21 - O_{2ref}}{21 - O_2}$$

$$CO[\%] = CO[ppm]\ x0.0001$$

$$CO[\frac{g}{m^3}] = CO[\frac{mg}{m^3}]\ x0.001$$

With :

- O_{2ref} a reference value selected by the user, this value has to be entered in the device in %.
- O_2 oxygen value measured in %.
- V_F the theoretical volume of flue gas in m^3 (given in the table of coefficient)
- NCV the net calorific value in MJ (given in the table of coefficient)
- CO_{2max} the maximum level in % in carbon dioxide of flue gas dry products (given in the table of coefficient)

21.2. Calculation of flue gas velocity

$$V = k\sqrt{\frac{2\Delta P}{M_{VF}}}$$

With :

- k : coefficient of the differential pressure item
- ΔP : differential pressure (dynamic pressure).
- M_{VF} : mass density of the flue gas (already calculated for the calculation of the higher efficiency).

KIMO®
INSTRUMENTS

LIGAZ

Logiciel d'exploitation des KIGAZ

Operating system for KIGAZ analyzers

1. Introduction

LIGAZ software, supplied with the gas analysers of the Kigaz range, allows to set the analyser, to create and give information a customers, boilers and inspections database, to process and download measurement datasets.

2. Software installation

2.1. Recommended minimum configuration

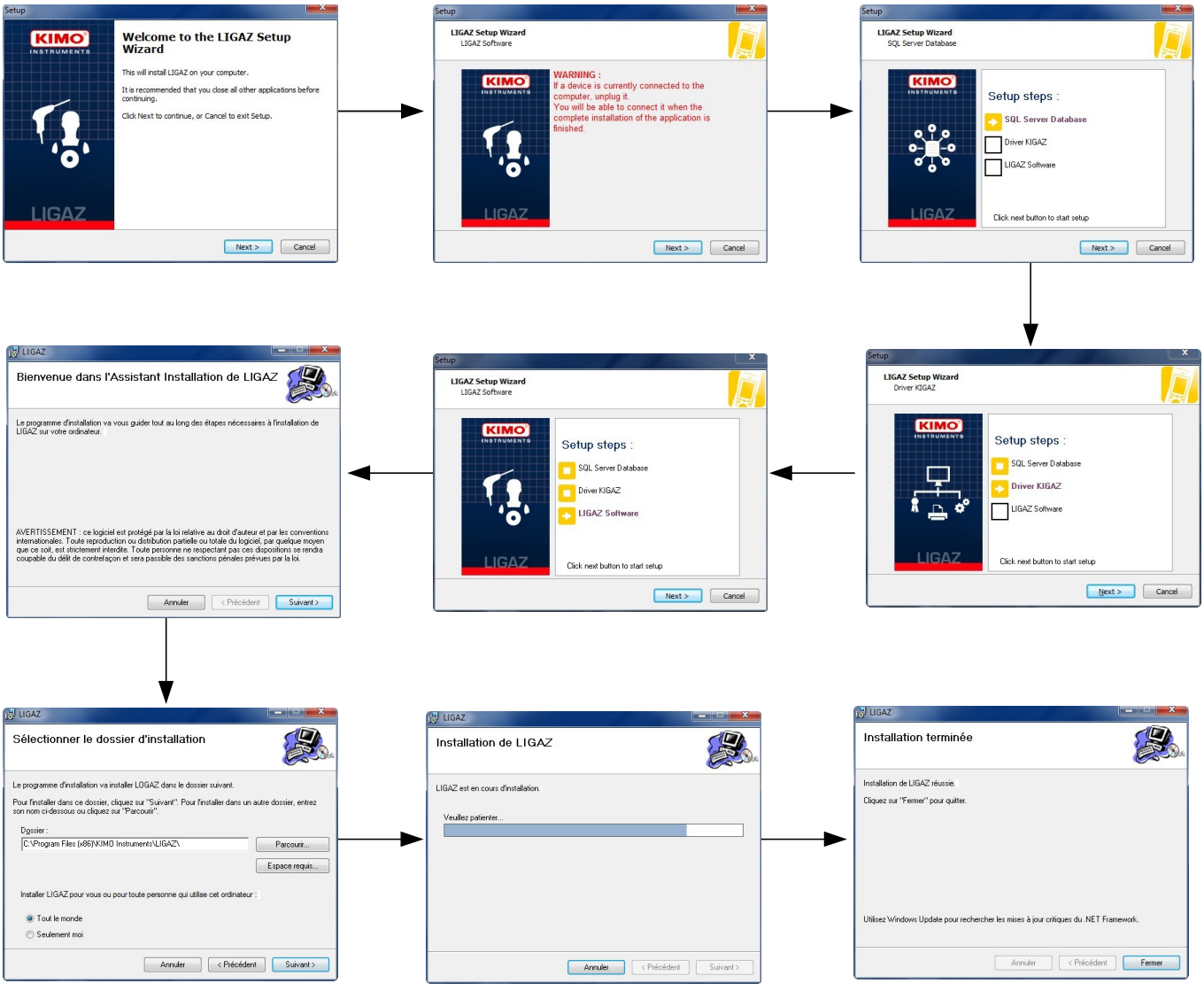
For the proper functioning of the software, the following minimum configuration is recommended :

- **Operating system :** Windows, XP, VISTA, 7
- **Communication port :** USB 2.0
- **DVD player**
- **RAM memory :** 1 GO
- **Disk memory :** 1 GO

2.2. Installation

➢ Put the DVD into the player of the computer.
*The automatically starts. If not, go to **"My computer"**, double-click on DVD drive then on **"SetupLIGAZ"** icon.*

➢ Follow the indications of installation.


Welcome to the LIGAZ Setup Wizard
This will install LIGAZ on your computer.
It is recommended that you close all other applications before continuing.
Click Next to continue, or Cancel to exit Setup.
Next >
Cancel
LIGAZ Setup Wizard
LIGAZ Software
WARNING :
If a device is currently connected to the computer, unplug it.
You will be able to connect it when the complete installation of the application is finished.
LIGAZ Setup Wizard
SQL Server Database
Setup steps :
SQL Server Database
Driver KIGAZ
LIGAZ Software
Click next button to start setup
Bienvenue dans l'Assistant Installation de LIGAZ
Le programme d'installation va vous guider tout au long des étapes nécessaires à l'installation de LIGAZ sur votre ordinateur.
AVERTISSEMENT : ce logiciel est protégé par la loi relative au droit d'auteur et par les conventions internationales. Toute reproduction ou distribution partielle ou totale du logiciel, par quelque moyen que ce soit, est strictement interdite. Toute personne ne respectant pas ces dispositions se rendra coupable du délit de contrefaçon et sera passible des sanctions pénales prévues par la loi.
Annuler
< Précédent
Suivant >
LIGAZ Setup Wizard
Driver KIGAZ
Driver KIGAZ
UGAZ Software
Sélectionner le dossier d'installation
Le programme d'installation va installer LIGAZ dans le dossier suivant.
Pour l'installer dans ce dossier, cliquez sur "Suivant". Pour l'installer dans un autre dossier, entrez son nom ci-dessous ou cliquez sur "Parcourir".
Dossier :
C:\Program Files (x86)\KIMO Instruments\LIGAZ\
Parcourir...
Espace requis...
Installer LIGAZ pour vous ou pour toute personne qui utilise cet ordinateur :
Tout le monde
Seulement moi
Installation de LIGAZ
LIGAZ est en cours d'installation.
Veuillez patienter...
Installation terminée
Installation de LIGAZ réussie.
Cliquez sur "Fermer" pour quitter.
Utilisez Windows Update pour rechercher les mises à jour critiques du .NET Framework.
Fermer

3. Start with the software

After double-clicking on the software launching icon on the desktop, the homepage of the software opens :

3.1. Meaning and functions of the menus bar (1)

- **File**
  - **Back to homepage :** reduce all the opened windows
  - **Save database :** save the database into the computer
  - **Import database :** import a Ligaz or Logaz (optional software) database saved into another computer
  - **Quit :** close the software
- **Database**
  - **Total :** opens the total database window (Customers, boilers and performed inspections)
  - **Customers :** opens the customers database window
  - **Boilers :** opens the boilers database window
  - **Database settings :** opens the saving settings window of the database
  - **Connection state**
- **KIGAZ**
  - **Unload KIGAZ :** allows to unload data saved in the analyser and the instrument setting
  - **Setting :** allows to set different parameters (autozero, combustibles, references...)
  - **Connect device:** allows to make recognize the instrument by the computer (**"Analyser connected"** will appear when an analyser is connected and recognized by the software)
- **Options**
  - **Interface :** allows to select the software background color

- **E-mail :** allows to set parameters to send emails
- **User :** information about the user
- **Languages : allows to select the software language** (French or English)

➢ **Windows :** allows to go from one window to another

➢ **? :**

- **User manuals :** allows to get to software and analyser user manuals
- **Hotline :** allows to get to the address and fax and phone number of the company or send a report to the after sales service
- **About :** indicates software version and database version

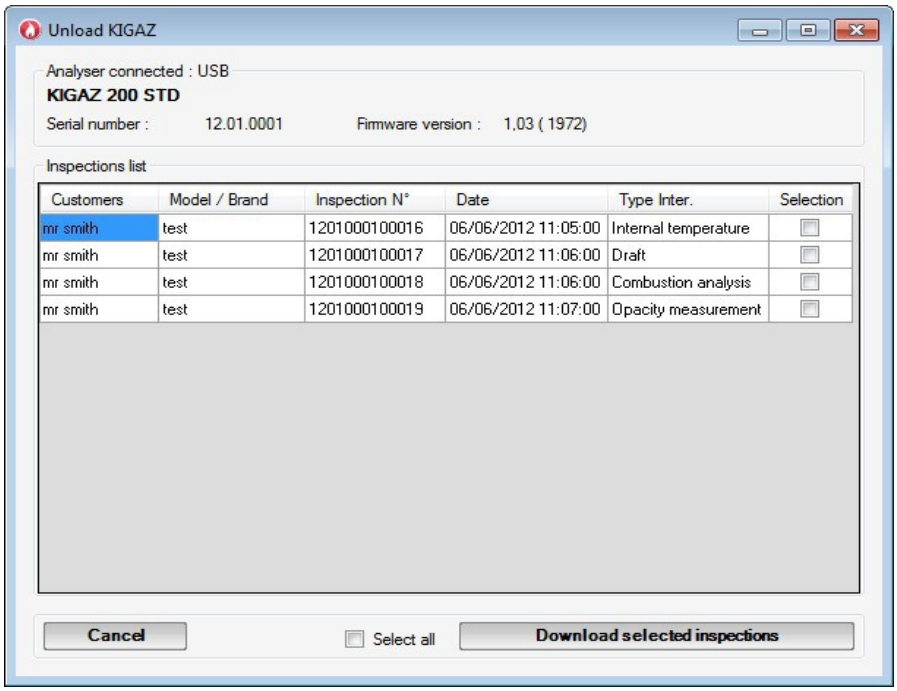
3.2. Meaning and functions of tool bar buttons (2)

Closes all the opened windows.	Opens the boilers database window.
Opens the total database window.	Opens the unload window of the analyser.
Opens the customers database window.	Opens the settings window of the analyser.

4. Unload inspections

Inspections stored in the analyser can be unload on the computer :

- Connect the analyser to the computer thanks to the supplied USB cable and **turn on the analyser**.
- Launch Ligaz software.
- Connect the analyser to the LIGAZ software clicking on **"Kigaz"** menu then click on **"Connect device"**.
  The software indicates that connexion is successful.
- Click on **"Kigaz"** menu then on **"Unload kigaz"**.
  The software recovers inspections contained in the analyser. This operation can take a few minutes.
  At the end of the recovery, the following window is displayed :



- Tick the corresponding boxes to the inspections to unload on the computer.
- Click on **"Download selected inspections"** button.
  *A message indicates that transfer is in progress then the message **"Transfer done"** is displayed : inspections have been well transferred.*
- Click on **OK.**
  *The **"Total database"** window is displayed with the transferred inspections.*

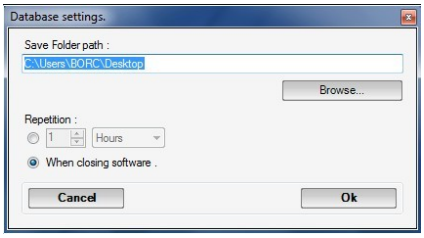
5. Use the different databases

Databases are used to give information about features of boilers and customers. Ligaz software allows to recover customers and boilers created in the analyser but does not allow to transfer in the analyser customers and boilers created with ligaz software.

- Launch the software by doube-clicking on the icon in the desktop.

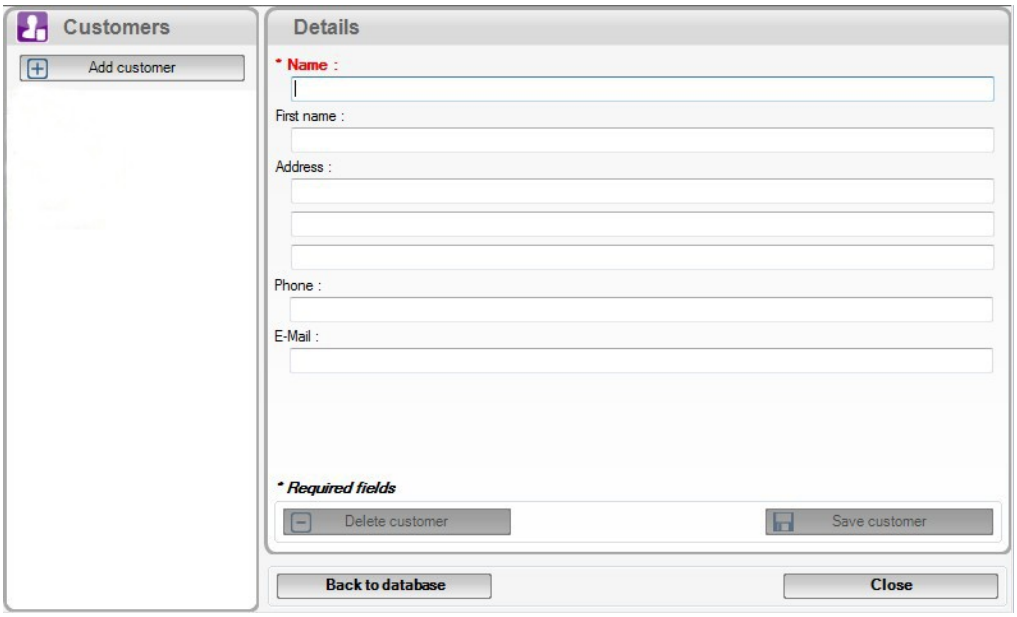
These databases are saved in the hard disk of the computer. Before starting to complete them, it is possible to define the save folder path of databases and the saving repetition.

- Click on **"Database"** in the menus bar then click on **"Database settings"**.
  The opposite window opens.
- Click on **"Browse"** to define the location where the databases will be saved.
- Tick then select the repetition of saving for a recurring saving (every hours, every two hours, etc...) or
- Tick **"When closing software"** to select a saving at the software closure.



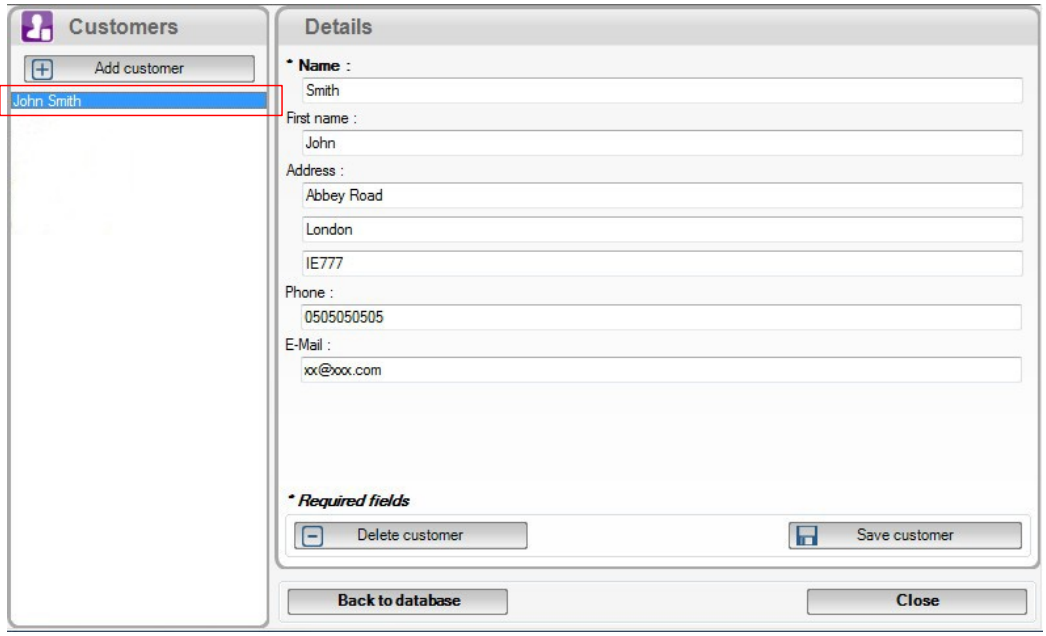
5.1. Use the customer database

- Click on button on the toolbar or click on **"Database"** menu then on **"Customers"**.
  The following window opens. Fields are not accessible.



- Click on **"Add customer"** button.
  Fields become accessible.
- Fill in the different fields.
  ***"Name"** and **"First name"** fields are compulsory.*
- Click on **"Save customer"** button.
  *This created customer appears below the **"Add customer"** button.*

Created customer

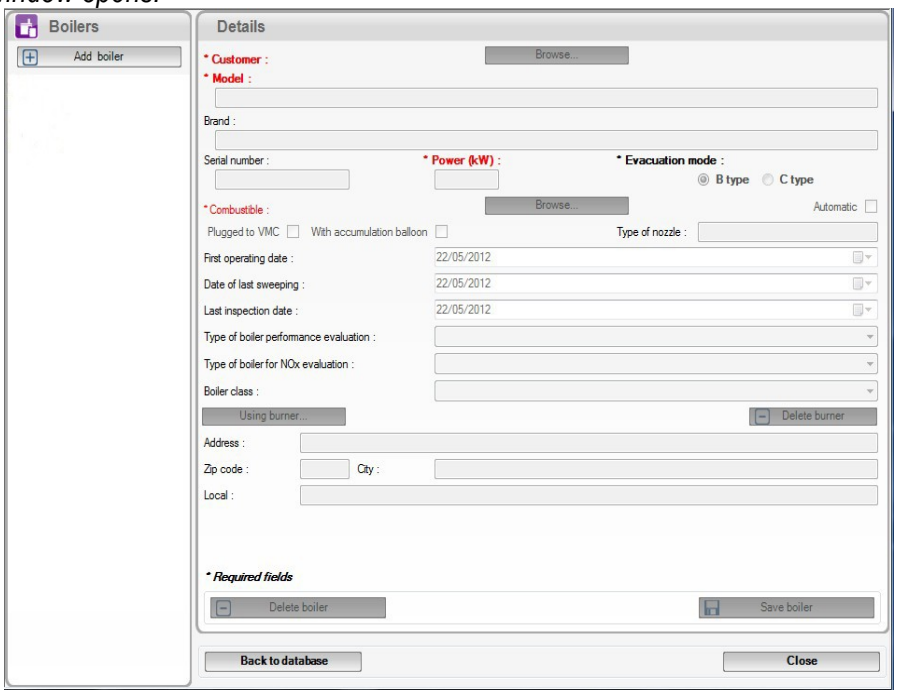


- Repeat this procedure to add others customers.
- Click on **"Close"** button to close the window or on the **"Back to database"** button to go to the total database.

5.2. Use the boilers database

Each customer can have several boilers.

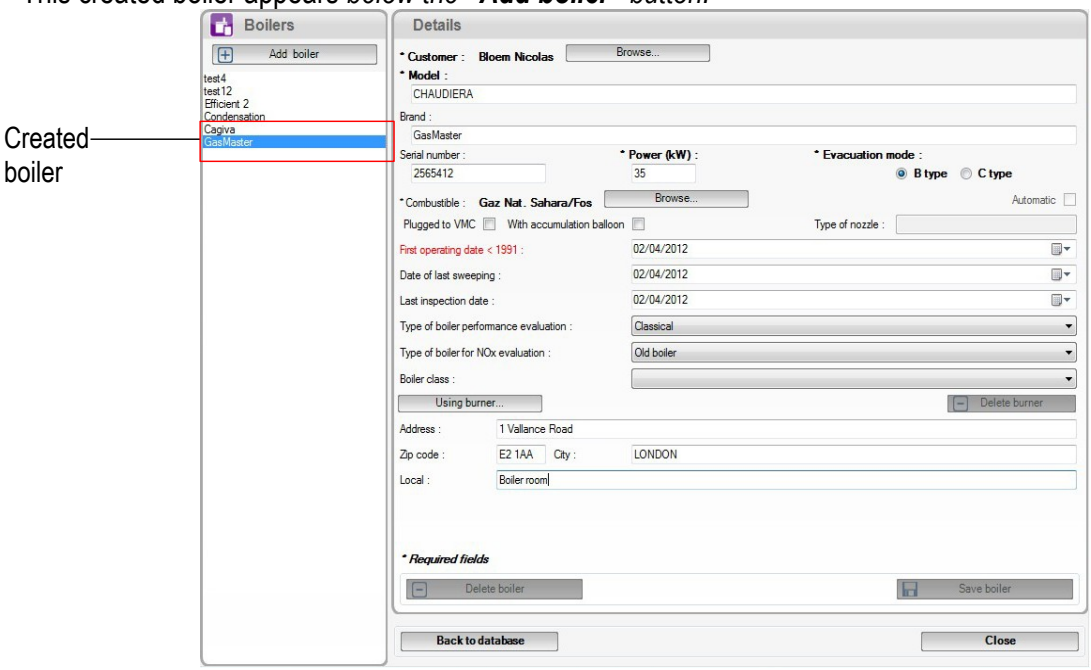
- Click on button on the toolbar or click on **"Database"** menu then on **"Boilers"**.
  The following window opens.



Every fields (brand, model …) are inaccessible and **"Browse"** button is inactive.

- Click on **"Add boiler"** button.
  *Fields become accessible and **"Browse"** button is active.*
- Click on **"Browse"** button in front **"Customer"** to link the boiler to a customer.
- Fill in **"Model"** and **"Brand"** fields (compulsory fields).
- Click on **"Browse"** button in front of **"Combustible"** and select the type of combustible of the boiler.
  *15 types de combustible are pre-programmed. If the type of combustible used by the boiler is not in the list, click on **"Add combustible"** button, fill in fields, click on **"Save this combustible"** button then click **"Select combustible"** button.*
- Click on **"Save boiler"** button.

This created boiler appears *below the* ***"Add boiler"*** *button.*

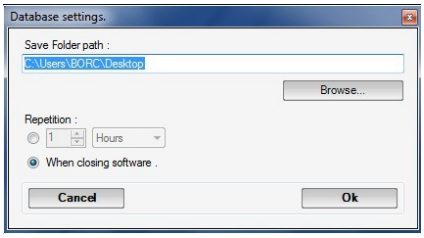


- Repeat the procedure to add others boilers.
- Click on **"Close"** button to close the window or on **"Back to database"** button to go to the total database.

5.3. Total database

This database allows to have a global view of all customers and their boilers with also the inspections.

5.4. Set the database



- Click on **"Database"** menu then on **"Database settings"**.
  The setting window of the database opens.
- Click on **"Browse"** button then define the saving folder.
- Then select the repetition, it means the type of automatic saving of the database.
  - Select the saving frequency of the database : between 1 hour and 30 hours or between 1 day and 30 days.
    OR
  - Tick **"When closing software"** to automatically save at the software closure.

5.5. Save while using

To guarantee information saving, you shall regularly proceed this way :

- Click on **"File"** menu.
- Click on **"Save database"**.

5.6. Import a database

When opening Ligaz software, to recover a database :

- Click on "**File"** menu.
- Click on **"Import database"**.
- Go to the saving folder of the database, select the database to open then click on OK.

6. Set the analyser

LIGAZ software allows to set the analyser. It is possible to :

- set the combustibles
- set the references (O_2, Altitude, atmospheric pressure)
- set the operators
- get details about sensors
- set date and time
- set the header of printing
- see the battery level
- get information about the analyser, update it and send report to after-sales service

- Connect the analyser to the computer with the supplied USB cable.
- Connect the analyser on main power thanks to the supplied adapter to avoid extinguishing of the analyser (low battery).
- Click on **"KIGAZ"** in the menu bar.
- Go down to **"Setting"** then click on the parameter to modify.
  "KIGAZ settings" *window opens.*

Changing parameters of the analyser has consequences on performed measurements and on the analysis calculation. Only a qualified technician is empowered to change the parameters of the device.

6.1. Change the combustibles

This window allows to change the list of combustibles programmed in the analyser. It also allows to modify features of each combustibles.

"KIGAZ settings" *window is open on* ***"Combustibles"****.*

- Double-click on one of the combustible features to modify.
- Enter the new value for the feature.
- Click on **"Transfer combustibles"** button to send modifications to the analyser.

6.2. Change the references

This window allows to modify the O_2 reference (oxygen level in which the analyser is used), altitude (altitude in which the analyser is used) and atmospheric pressure (pressure in which the analyser is used).

"KIGAZ settings" *window is open on* ***"References"****.*

- Click on the field to modify.
- Enter the new value.
- Click on **"Transfer references"** button to send modifications to the analyser.

6.3. Manage the operators

This window allows to add, delete or modify an operator.

"KIGAZ settings" *window is open on* ***"Operators"****.*

- Double-click on **"Name"** column to enter the operator name.
- Click on **"Transfer operators"** button to send modifications to the analyser.

6.4. Change date and time

This window allows to de sync the analyser time and the computer time.

"KIGAZ settings" *window is open* ***"Date/time"****.*

- Click on **"Set to local time"** button to adjust analyser time to computer time.

6.5. Sensors state

This window allows to access to sensors features of the connected analyser. These features are :

- type of sensor (CO, NO,...)
- state of sensor (connected, not connected...)
- serial number of the sensor

6.6. Battery level

This window allows to see the battery level of the analysis. The analyser must turned on and on battery.

6.7. Set printings

This window allow to enter the 4 header lines of the ticket printed by the analyser.

"KIGAZ settings" *window is open on* ***"Printing"****.*

- Enter the required text in **« Header line 1, 2, 3 and 4 »** lines.
- Click on **"Send lines"** button to send modifications to the analyser.

6.8. Access to information about the instrument and update the instrument

6.8.1. Access to information about the instrument

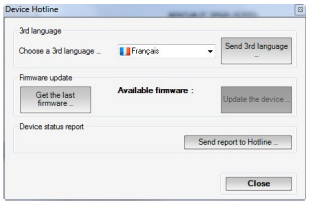
"KIGAZ settings" *window is open on* ***"Information"*** *and gives the following information :*

- Product code : ex : KIGAZ 300
- serial number : ex : 00.01.2057
- firmware version : ex : 0.92
- Build : ex : 1247

It is possible to give an inventory number to the device (number selected and given by the user) :

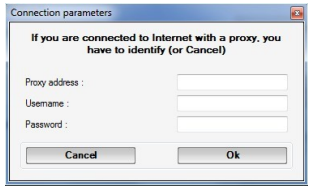
- Click on **"Inventory number"** field and enter the desired number.
- Click on **"Write"** button.

6.8.2. Update the instrument



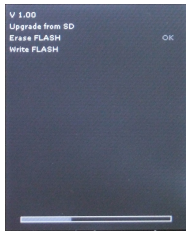
It is also possible to update the firmware of the analyser, it means the internal software that allows to the analyser to work properly. It is also possible to install a 3rd language.

- Click on **Kigaz** menu then go to **Setting** and click on **Information**.
- Click on **"Device hotline"** at the bottom right of the window.
- Click on **"Get the last firmware"** button**.**
  The opposite window opens.
  Two choices are then possible :



a) The Internet connection is not protected by a proxy

- Click on **"Cancel"** button on the connection parameters window.
  A progress bar displays then the available firmware number displays.
- Click **"Update device"** button.
  The update lasts for a few minutes.

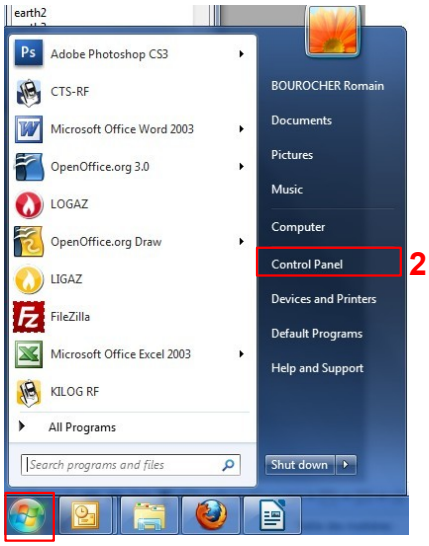


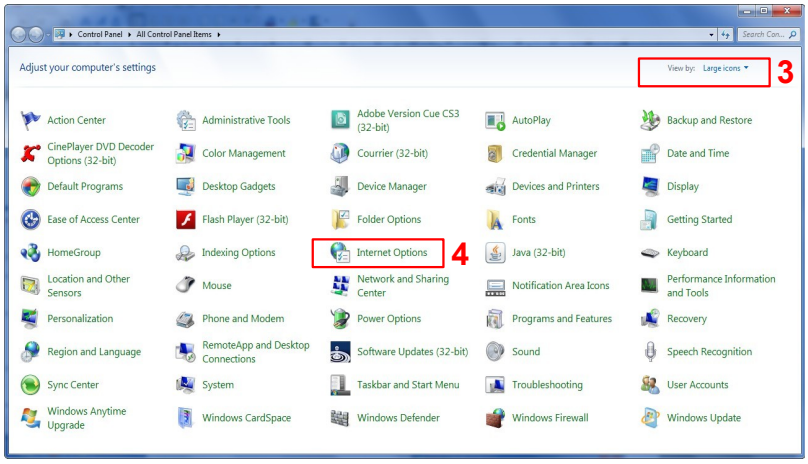
- Turn off then turn the device. *A black screen with a progress bar displays (see opposite) then It turns off itself.*
- Turn on the device then go to **"Information"** menu of the analyser to check if the update has been taken into account.

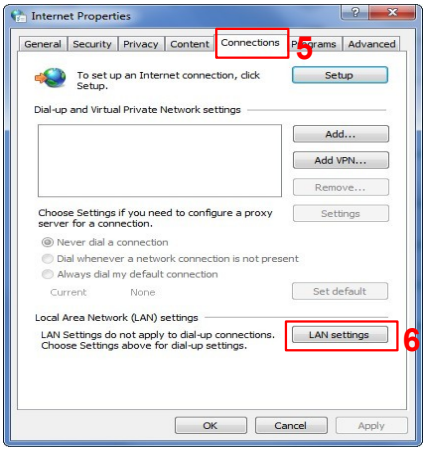
b) The Internet connection is protected by a proxy

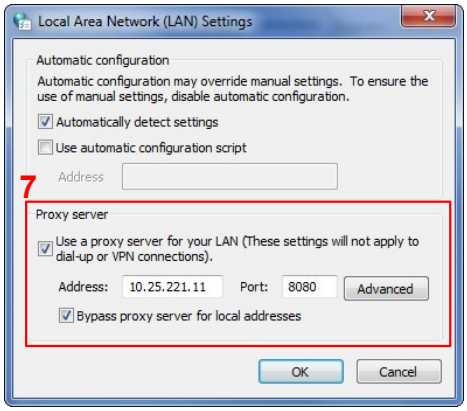
Address and serial number of the proxy, user name and corresponding password must be entered.
To get them into Windows 7 :

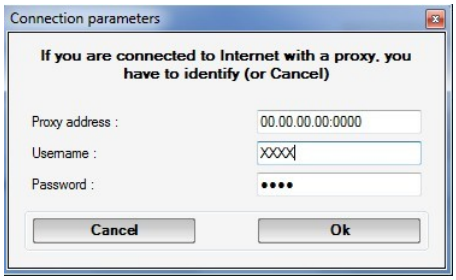
- Click on **"Start" (1)** then on **"Control panel" (2).**
- In **"Control panel"** window, click on the up right on **"Large icons"** in **"View by" (3).**
- Click on **"Internet Options" (4)** :the **"Internet Properties"** window opens.
- Click on **"Connections"** tab **(5)** then on **"LAN settings"** button **(6)** : the **"Local Area Network (LAN) Settings" window** opens with the information about the proxy server **(7)**.



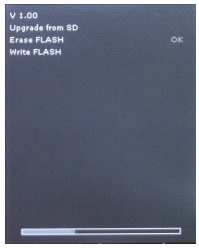








- Copy the address and the port in the **"Address"** line of the connection window as follows : 00.00.000.00:0000
  (Address : 00.00.000.00 ; Port : 0000)
- Enter the user name and the corresponding password : data entered at the starting of the computer when the user logins.
- Click on **"Validate"** button.
- Click on **"Update device"** button.
  The update lasts for a few minutes.
- *Turn off then turn the device. A black screen with a progress bar displays (see opposite) then It turns off itself.*
- Turn on the device then go to **"Information"** menu of the analyser to check if the update has been taken into account.



6.8.3. Install a 3rd language

- Select the language to send in the drop-down list box.
- Click on **"Send 3rf language..."** button.

6.8.4. Send a report of the device to the After-Sales Service

- Click on **"Send report to hotline"** button.
  Kimo after-sales service will receive a report about the general state of the device only readable the after-sales service.

6.9. Back to factory parameters

It is possible to set the device with the factory parameters.

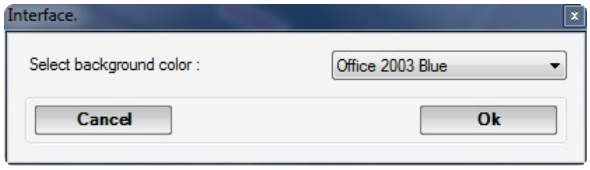
The ***"Settings"*** *window is open on* ***"Information"***.

- Click on **« Back to factory settings »** on the bottom left.

The device is now set with the factory parameters.

7. Options

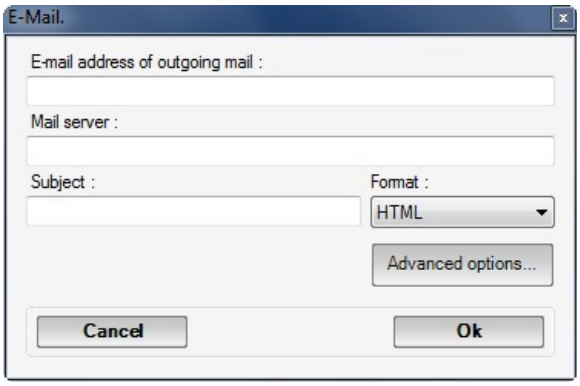
7.1. Interface



It is possible to change the window color of the software :

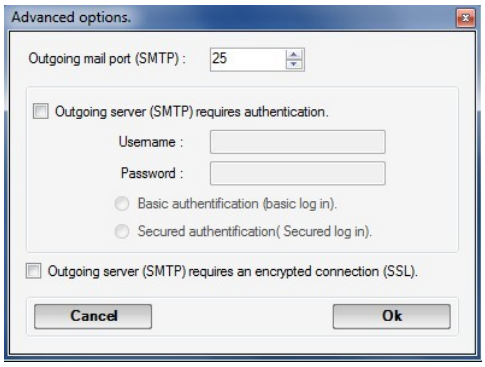
- Click on **"Options"** menu.
- Click on **"Interface"** sub-menu.
  The opposite window appears.
- Select the type of design : Office 2007, Office 2003 Blue, Office 2003 Silver, Office 2003 Green or Office XP.
- Click on **"Validate"** button.

7.2. Email

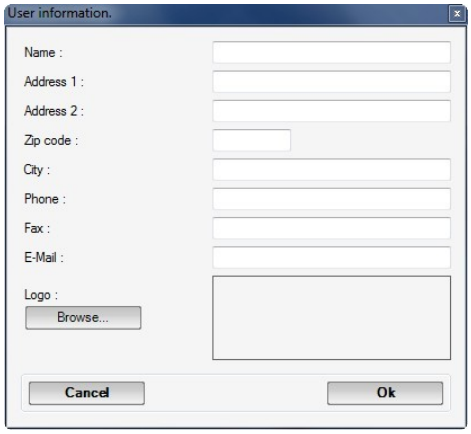


This option allows to set the email sending parameters in order to send report to the after-sales service.

- Click on **"Options"** menu.
- Click on **"Email"** sub-menu.
  The opposite window appears.
- Fill in the different fields :
  - **Email address of the outgoing mail :** email address of the sender (p.durand@orange.fr)
  -
  - **Mail server :** server address used to send email (ex : smtp.orange.fr).
  - **Mail subject.**
  - **Mail format :** plain text or html
  - **Advanced options :** by clicking on this, the email setting window opens and allows to set the SMTP outgoing server. This information is delivered in the subscription documents of the Internet access provider
- Click on **"Validate"** button.



7.3. User information



This option allows to give information about the software user.

- Click on **"Options"** menu.
- Click on **"User"** sub-menu.
  The opposite window appears.
- Fill in the different fields.
- Click on **"Validate"** button.

7.4. Change the language

This option allows to change the interface language.

- Click on **"Options"** menu.
- Click on **"Languages"** sub-menu.
- Select the language : French or English

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